REMARKS

This application has been reviewed in light of the Office Action dated February 12, 2003. Claims 1-24 are presented for examination. Claims 1-15 and 20-24 have been amended to define more clearly what Applicant regards as his invention. Claims 1, 8, 9, 20, 23, and 24 are in independent form. Favorable reconsideration is requested.

The Office Action objected to the Abstract because it contained more than one paragraph. The Abstract has been amended to overcome the noted objection.

Claims 21 and 22 were objected under 37 C.F.R. § 1.75(c) as being in improper multiple dependent form. The claims have been amended as deemed necessary to ensure that they conform fully to the requirements of 37 C.F.R. § 1.75(c).

Claims 1-6, 8-14, and 16-24 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,214,751 (*Robert*). Claims 7 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Robert*, in view of U.S. Patent No. 6,205,259 (*Komiya et al.*).

As shown above, Applicant has amended independent claims 1, 8, 9, 20, 23, and 24 in terms that more clearly define what he regards as his invention. Applicant submits that these amended independent claims, together with the remaining claims dependent thereon, are patentably distinct from the cited prior art for at least the following reasons.

The present invention is directed to time-lapse photography. In conventional systems, a photographer has to leave the camera in place during the entire period for photographing a time-lapse sequence of a scene, making such photography difficult and costly to perform.

The aspect of the present invention respectively set out in independent claims 1, 8, 9, 20, 23, and 24 address the foregoing problem by allowing image data, of a time-lapse sequence to be recorded from a fixed viewing position and direction, enabling the photographer to revisit the scene at the required times without having to leave the camera in place. Further, they afford the photographer full manual control of the camera to record the images.

The aspect of the present invention set forth in claim 1 is an apparatus for processing image data defining a plurality of input images of a changing scene recorded at different times to generate data for defining a sequence of images conveying an evolving representation of the scene from a fixed viewing position and direction between the times at which the first and last input images were recorded. The apparatus includes an image registering unit, arranged to register the input images so that registered input images represent the scene from the same viewing position and direction relative to the scene, and a pixel value interpolator, arranged to interpolate between pixel values of the registered input images to generate pixel values for interpolated images from the same viewing position and direction relative to the scene for the image sequence.

One important feature of claim 1 is the image registering unit that registers the input images so that the registered input images represent the scene from the same viewing position and direction relative to the scene, and the pixel value interpolator that interpolates between the pixel values of the registered input images to generate pixel values for interpolated images from the same viewing position and direction relative to the scene for the image sequence.

Robert relates to a method for temporal interpolation of images, enabling the reconstitution of the luminance value of the pixels of a missing image in a series of images representing the same object. The *Robert* method generates images representing images that would be recorded by a camera <u>at different viewing positions and directions</u> as the camera <u>moves</u> across a <u>static</u> scene. More particularly, the *Robert* method estimates a velocity vector for each pixel of a single frame, which is called a motion carrier frame, and then determines, in each of the frames to be interpolated, the pixels called son pixels which have a velocity vector equal to the velocity vector of a pixel called the father pixel corresponding to a same point of the object represented by the series of frames. This point is assumed to move at the same velocity during the time travel from T_a to T_b (Column 3 lines 9-20). The *Robert* method includes estimating a velocity vector for each pixel of a single frame corresponding with an instant T_j between T_a and T_b, or being T_a or T_b. For each pixel of this image, called the father pixel, the coordinates of the centre of the pixel to be interpolated, called the son pixel, are successively determined corresponding with the centre of the father pixel by a translation whose vector is a function of the velocity vector of the father pixel, multiplied by the duration T_b minus T_j and T_j minus T_a (Column 3 lines 24-63, and the Abstract). However, nothing has been found in *Robert* that teaches or suggests an apparatus for processing image data defining a plurality of input images of a changing scene recorded at different times to generate data for defining a sequence of images conveying an evolving representation of the scene from a <u>fixed viewing position and direction</u> between the times at which the first and last input images were recorded that includes an image registering unit, arranged to register the input images so that registered input images represent the

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scene from the same viewing position and direction relative to the scene, and a pixel value interpolator, arranged to interpolate between pixel values of the registered input images to generate pixel values for interpolated images from the same viewing position and direction relative to the scene for the image sequence. In fact, *Robert* is silent, and indeed teaches away from, a system which represents a <u>changing</u> scene from a <u>fixed</u> camera position and direction.

Accordingly, Applicant submits that claim 1 is clearly allowable over *Robert*.

Independent claims 9 and 23 are a method and another apparatus claim, respectively, corresponding to apparatus claim 1, and are believed to be patentable for at least the same reasons as discussed above in connection with claim 1.

The aspect of the present invention set forth in claim 8 is an image processing apparatus for generating data for a time-lapse sequence of images of a changing scene from the same viewing position and direction relative to the scene. The apparatus includes a transformation calculator that calculate transformations to registered input images recorded from at least one of different viewing positions and different viewing directions, so that the registered input images represent the scene from the same viewing position and direction relative to the scene. The apparatus also includes an image data generator, using the input images and the calculated transformations, that generates data for images of the scene from the same viewing position and direction to be displayed in the sequence.

One important feature of claim 8 is calculating transformations to registered input images, recorded from at least one of different viewing positions and different viewing directions, <u>so that the registered input images represent the scene from the same viewing position</u>

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and direction relative to the scene, and <u>generating, using the input images and the calculated</u>

<u>transformations, data for images of the scene from the same viewing position and direction to be</u>

<u>displayed in the sequence</u>.

Nothing has been found in *Robert* that teaches or suggests

calculating transformations to registered input images, recorded from at least one of different

viewing positions and different viewing directions, so that the registered input images represent

the scene from the same viewing position and direction relative to the scene, and generating,

using the input images and the calculated transformations, data for images of the scene from the

same viewing position and direction to be displayed in the sequence, as recited in claim 8.

Accordingly, Applicant submits that claim 8 is clearly allowable over *Robert*.

Independent claims 20 and 24 are a method and another apparatus claim,

respectively, corresponding to apparatus claim 8, and are believed to be patentable for at least the

same reasons as discussed above in connection with claim 8.

A review of the other art of record has failed to reveal anything which, in

Applicant's opinion, would remedy the deficiencies of the art discussed above, as a reference

against the independent claims herein. Those claims are therefore believed patentable over the

art of record.

The other claims in this application are each dependent from one or another of

the independent claims discussed above and are therefore believed patentable for the same

reasons. Since each dependent claim is also deemed to define an additional aspect of the

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invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

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